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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/751,000	12/29/2000	Sadao Hirae	P/1596-51	9450

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EXAMINER

WINTER, GENTLE E

ART UNIT PAPER NUMBER

1746

DATE MAILED: 03/12/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/751,000

Applicant(s)

HIRAE ET AL.

Examiner

Gentle E. Winter

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 January 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,5,7,9-12,19,21,23 and 25-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,5,7,9-12,19,21,23 and 25-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 December 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other:

DETAILED ACTION

Response to Amendment

Claim Objections—Maintained and Withdrawn in Parts

1. Claims 10-12, 14-16, 26-28, 30-32 were objected to under 37 CFR 1.75(c), as being of improper dependent form. Of the above claims 14-16 and 30-32 have been canceled. As to claims 10 and 26 applicant's representative (applicant) argued:

Candidly, the applicant's undersigned representative is not certain that he understands the objection. For example, claim 10 specifies that 'the ultraviolet light emitted from the ultraviolet emitter of claim 9 has a wavelength in the range of 242.4 to 300 nm. That is a classic structural limitation on the recited structure. It structurally defines the emitter.

2. Applicant arguments are accepted and the objection is withdrawn. There was initially some concern that virtually all UV emitters emit in the enumerated ranges, and as such the limitation was not structural. Based on applicant's arguments it is assumed that the emitter disclosed *preferentially* emits in the disclosed range. An understanding consistent with what one of ordinary skill would conclude.

3. With respect to claim 11-12, and 27-28 applicant argued:

Similarly, claim 11 recites that the cleaning solution has or includes a base solution. Again, this claim is quintessentially structural in nature. Similar remarks apply to the remaining claims. It is believed that the claims are in proper form.

4. Unfortunately, this examiner must respectfully disagree. In describing the structure, a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ2d 1647 (1987). To this end the base solution is drawn to a non-structural component. For at least the foregoing the objection will not be withdrawn at this time. It is noted that the claims are not drawn to a composition, but rather to an apparatus.

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5. Claims 11-12, and 27-28 are objected to for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. In the above claims the additional limitation is drawn to a future intended use and as such fails to substantively narrow the independent claim from which it depends. Specifically, the recitation of adding a base to the apparatus is drawn to a future intended use. The above-indicated claims are rejected/allowed, according to their independent base claims and any intervening dependent claims.

Claim Rejections - 35 USC § 112—Withdrawn

Claims 9-12, 25-28, were rejected because each of claims 9 and 25 are drawn to an apparatus but included process limitations. The claims have been amended to recite future intended uses. The rejection is no longer proper.

Claim Rejections - 35 USC § 102—Maintained

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 3, 5, 7, 9, 11, 17, 19, 21, 23, 25, and 27 were and are rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,464,480 to Matthews. In response applicant argued:

In each of the remaining independent claims in the application, namely claims 1, 9, 17 and 25, it is essentially recited that the methodology or apparatus for either treating or cleaning a substrate is carried out by supplying a cleaning solution to the substrate following the two steps indicated below in order.

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7. As a preliminary matter, the sequence of the steps, is seemingly of little consequence with respect to apparatus claims. As to the method claims, the sequence is a meaningful limitation. Matthews discloses, at least in figure 1 an associated text, a method of cleaning substrates including supplying a cleaning solution to the substrate, and subsequently irradiating the cleaning solution applied to the substrate with UV light.

8. In differentiating Matthews, applicant remarked/argued:

Matthews, et al.,... discloses a technique for oxidizing an organic substance into an insoluble gas by causing the ionized water to absorb ozone water, and irradiating ozone with ultraviolet light to form oxygen molecules at the time of blowing.

9. Again the arguments appear to be drawn to the method claims and not the apparatus claims. As far as the method claim go, the references to "insoluble gas" is simply not understood. Further, the statement below is confusing:

The instant independent claims do not call for a process that has ozone water mixed with de-ionized water. Rather, the invention dissolves ozone in the de-ionized water.

10. It appears that applicant is differentiating the instant method claim on the basis that the de-ionized water and ozonated de-ionized water do not mix. How this would be achieved is not altogether clear, and more importantly such a limitation is not believed to be explicitly in the claim.

Applicant further argues:

In the present invention, the operation of the apparatus is carried out in an ordinary environment. Thus, ozone water, once exposed to ambient air, is used immediately according to purpose. This is because ozone is quick in reaction, and also needs to be heated in order to increase the rate of reaction.

11. The method claims do not appear to recite ambient conditions, and as such, the limitation is not properly in the claims.

Furthermore, the source of ultraviolet light in Matthews, et al. is not directed to a substrate surface which is a principal

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object to be cleaned. It is therefore unclear that oxygen is generated efficiently by ultraviolet light in the part of the substrate to be cleaned. In other words, the primary concern of Matthews, et al. is irradiation of ozone with ultraviolet light.

12. Again the limitation does not appear to be in the claim, however if such a limitation were present DeGendt (as referred to in paper 2) appears to disclose such a system, or an obvious variant thereof.

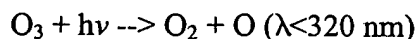
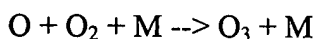
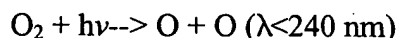
13. Claims 1, 3, 5, 7, 9, 11, 17, 19, 21, 23, 25, and 27 were and are rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,464,480 to Matthews.

14. Regarding claim 1, the instant application claims a method for substrate cleaning, including the steps of supplying an ozone containing cleaning solution to the substrate and irradiating the cleaning solution with ultraviolet light.

15. Matthews discloses a substrate treating method that utilizes a tank, fitted with ultraviolet light source, for subjecting a cleaning solution to UV radiation (column 10, line 3 *et seq.*).

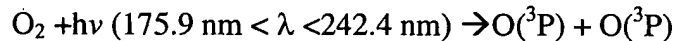
Further, the UV source is disclosed as being mountable on the outside of the tank or, preferably, is submerged into the tank and placed over diffuser, as shown at 3 in FIG. 1 and FIG. 2. The UV light is disclosed to have utility as a means for generating oxygen free radicals and oxygen molecules from ozone bubbled directly into the treatment tank for removal of organic materials on wafer during operation of the disclosed ozonated water process.

16. With specific respect to claims 3 and 7, Matthews fails to disclose the specific wavelength of the UV light source. However the chemistry described appears to mirror that which would occur according to the Chapman cycles (Chapman, 1930), namely:



uv ($\lambda < 240$ nm) higher energy than $h\nu$ ($\lambda < 320$ nm)

17. Of note, is the disclosure of Brasseur and Solomon [1985] disclosing:



18. In either case the formation of the oxygen radical, which is described in Matthews would have required the instantly claimed wavelength. (See also claims i.e. claim 12). Claims 5 and 7, further disclose the addition of a base. Matthews discloses that ammonia gas is diffused into the tank, and goes on to disclose that “[o]ptionally, ozone in conjunction with UV radiation may be used to generate the oxygen free radical”. Because, ammonia, when bubbled into water, forms ammonium hydroxide, and ammonium hydroxide is a base, the limitation of claims 5 and 7 regarding the presence of a base are disclosed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. Claims 10, 12, 26, and 28 rejected under 35 U.S.C. 103(a) as being unpatentable over Matthews, as discussed above, in view of United States Patent No. 6,403,498 to Matsuo et al. Each and every limitation of claims 10-12 and 26-28 are identically disclosed in Matthews, as set forth above, except that Matthews et al. apparently fails to explicitly disclose the presence of a UV light source having a wavelength between 242.4 and 300 nm. It is noted that such a disclosure is necessarily inherent. Absent such an element the system seemingly would not

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function. However, in the interests of compact prosecution, a secondary reference is provided to make explicit, that which is implicit in Matthews. Matsuo et al. disclose a processing chamber and a lamp chamber that are insulated from each other by a shutter. When the shutter is opened, the processing chamber is connected to the lamp chamber, such that an ultraviolet ray from the lamp is irradiated onto the substrate. When the lamp is turned on, a main ultraviolet ray having a wavelength of 254 nm and a subordinate ultraviolet ray having a wavelength of 185 nm are emitted. The artisan would have been motivated to use UV emitting source of Matsuo et al. in the Matthews invention, because absent such an element the UV facilitated reactions would not occur. Further, it is noted that the basic chemistry of UV induced radical oxygen production, is well known in the prior art of record. It is noted that Applicant, seemingly had to rely on such a source in order to provide the equations on page 8. See also the thesis of Matthew J. Harris, disclosing the indicated wavelengths, and disclosing that the UV induced chemistry was known since the 1930's, and providing the motivation for selecting such wavelengths if practicing the invention of Matthews.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**

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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

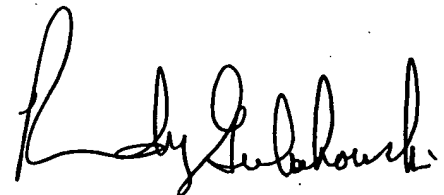
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gentle E. Winter whose telephone number is (703) 305-3403. The examiner can normally be reached on Monday-Friday, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy P. Gulakowski can be reached on (703) 308-4333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications. The direct fax number for this examiner is (703) 746-7746.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Gentle E. Winter
Examiner
Art Unit 1746

March 3, 2003

A handwritten signature in black ink, appearing to read "Randy Gulakowski", is written over a horizontal line.

RANDY GULAKOWSKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700